ARMY AIR FORCES
SCHOOL OF AVIATION MEDICINE
RANDOLPH FIELD, TEXAS

Classification changed to OPEN by authority of the Commandant AAF SAM, 18 Mar 45.

PROJECT REPORT

Project No. 210 Date 27 January 1944

Report No. 1

1. Title: Collapse at Low Altitude in a Case of Previously Unrecognized Heart Disease.

2. Object: To describe an example of collapse in a subject with rheumatic type of heart disease, previously unrecognized, after only three minutes at 15,000 feet in the low pressure chamber.

3. Conclusions and Recommendations:

a. A 36-year-old medical officer with no previous history of rheumatic infection or diminished cardiac reserve collapsed after three minutes at 15,000 feet in the altitude chamber.

b. Post-collapse examination revealed an enlarged heart with mitral stenosis and mitral insufficiency.

c. The incident emphasizes the need of a careful examination for anatomical defects in all subjects who display syncope during mild anoxia.

Report By:

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Approved:

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Acting Commandant.

A TRUE COPY
CLIFFORD [illegible], [illegible]
Captain, M. C.

Introduction:

Collapse of the human subject at 15,000 feet without oxygen is a distinctly unusual phenomenon. In several thousand runs in the low pressure chamber at the School of Aviation Medicine only one previous case has been observed. This was in a navigation cadet who had complained of difficulty in breathing, dizziness, faintness, blurring of vision, and gasping type of respiration while flying in aircraft at altitudes of 8,000 feet to 12,000 feet. When this subject was taken in the altitude chamber to 15,000 feet at a rate of climb of 1500 feet per minute he became somewhat somnolent and giddy and within two minutes showed imminent syncope. At least part of this cadet's difficulty at altitude was the result of hyperventilation. Further data on him is not available at this time.

The medical officer described below made his first flight in the low pressure chamber on 8 October 1943. Ascent to 15,000 feet was made in five minutes without oxygen. In less than 3 minutes at this altitude the subject began to show evidence of syncope, and bradycardia. The altitude was dropped in one minute from 15,000 feet to 3,000 feet. Another occupant at this time complained of pain in the ears and it was necessary to re-ascend for one minute to 4,000 feet. In the next two minutes descent from 4,000 feet to ground level was made. The total time consumed from the start of the run to the end was 13 minutes. The total time at 15,000 feet was 3 minutes.

The inside observer on the run stated that the subject was unconscious at 15,000 feet although the latter denies this. On descent he regained consciousness and on leaving the chamber was found to have a pulse rate in the neighborhood of 50 beats per minute. The officer was hospitalized immediately. Examination at first revealed nothing unusual except that the pulse rate was 54 beats per minute. The blood pressure was within normal limits.

Somewhat later one observer at the hospital thought that he heard a diastolic murmur at the apex of the heart when the subject was recumbent. It was for a check on this finding that this officer was referred to the Department of Aviation Medicine for further examination.

Examination at S.A.M.

Cardiac history of this officer was entirely negative. He had tonsillitis at the age of 5, numerous sore throats during childhood but no other rheumatic manifestations. A tonsillectomy was performed at the age of 15 and deviation of the nasal septum was corrected at the age of 26. There had been no manifestations of diminished cardiac reserve at any time and he had been observed to take part in strenuous exercise including baseball during the field exercises of the S.A.M. just two weeks before the flight in the low pressure chamber.

Physical examination revealed a stocky white male, age 36 years, height 65 inches, weight 169 pounds, a captain in the Medical Corps. The general physical examination was negative for evidence of congestive heart failure. The skin had a yellow tinge (recent atabrine). The point of

the figure also but less distinctly. The stethograms recorded on 11 November at the apex, at the sternal edge in the region of the fourth intercostal space, in the pulmonic area, and in the aortic area (Fig. 5) show little except a systolic murmur at the apex and in the pulmonic area along with distinct splitting of the first and second sounds best noted in the pulmonic area. The second part of the split pulmonic sound is 0.12 sec. after the initial portion in contrast to the opening snap recorded on the previous day which is 0.08 second distant. Further, this splitting was recorded best at the base. The opening snap, as indicated, was recorded, when present, at the apex.

Discussion:

The diagnosis made was unknown heart disease of rheumatic type with mitral stenosis, mitral insufficiency, enlarged heart (left ventricle and left auricle) and normal sinus rhythm. Since the subject had no limitation of physical activity he would be classified as Class I in the American Heart Association classification. The most interesting feature of the case is that although there was no known limitation of physical activity there was rapid collapse with a mild degree of anoxia even for a brief interval. This fact calls attention to the need for a careful physical examination of any subject who likewise shows syncope at low altitudes without oxygen.

There was one complicating factor. This officer had been taking atabrine daily from 31 August to 7 October. The dose for the first four days was 100 mg; thereafter it was 50 mg. It was discontinued because of the appearance of skin spots. Since he had no other toxic manifestations, and since collapse or even reduction in tolerance to anoxia has not been observed with this drug at this altitude (AAF S.A.M. Research Project No. 112, Report No. 1), it was believed that it did not play a part in the development of this officer's collapse.

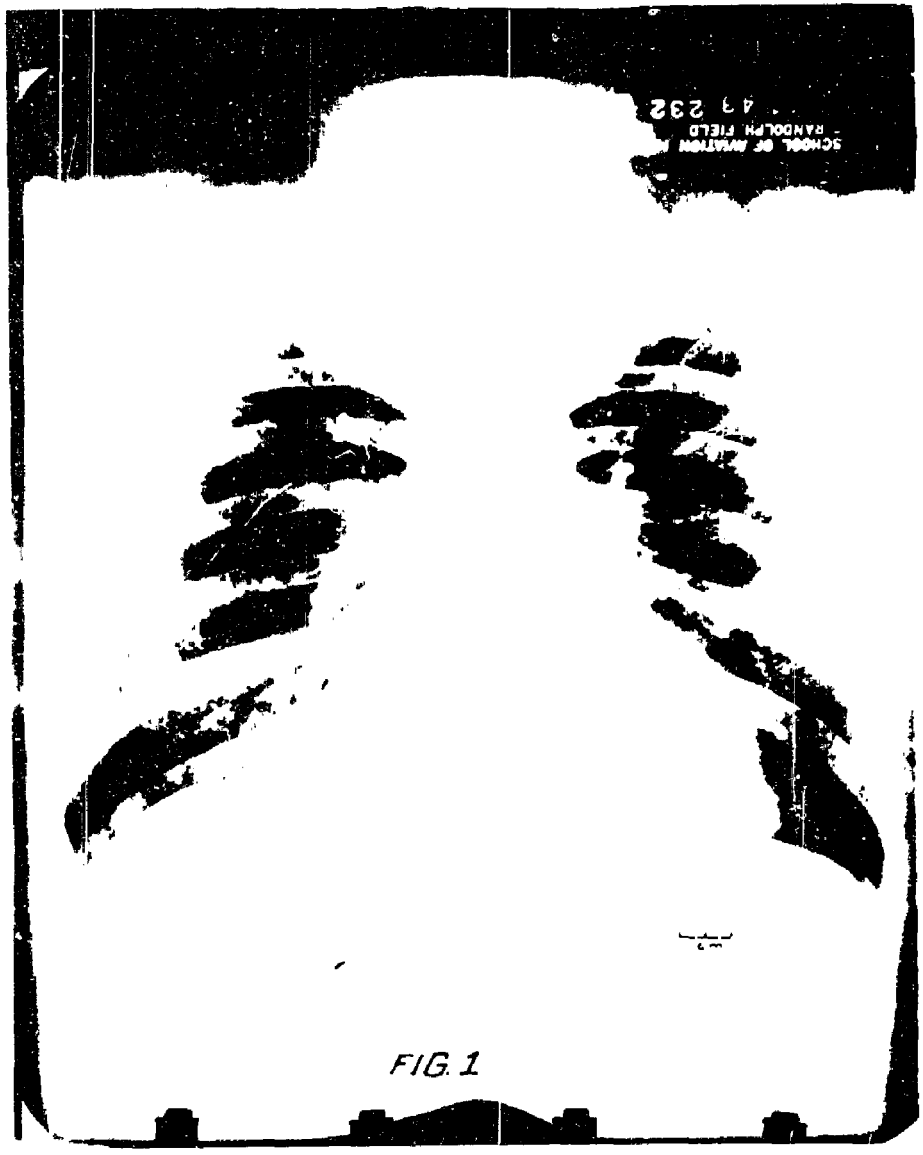
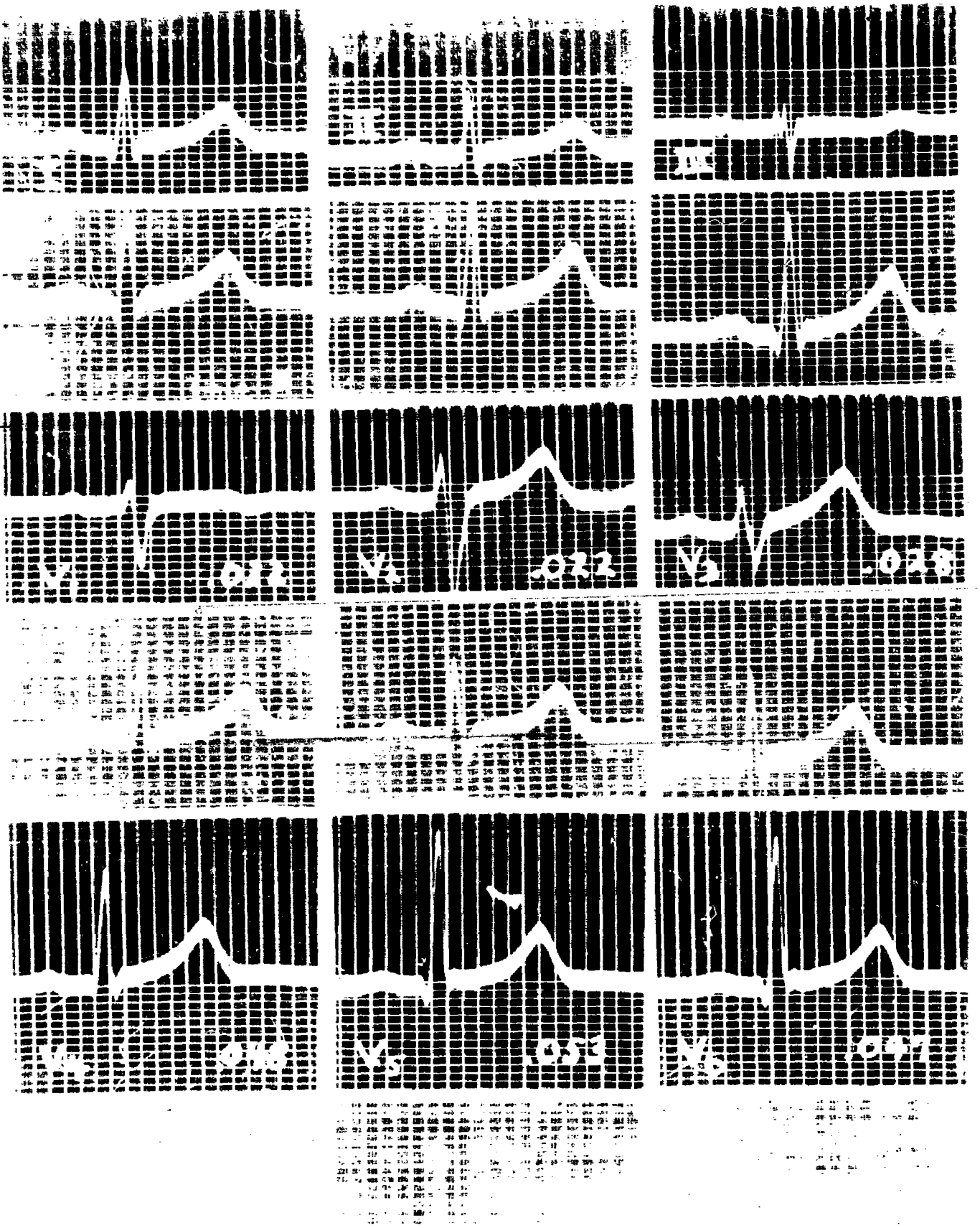


FIG. 1

FIG. 2



THE SCHOOL OF AVIATION MEDICINE
RANDOLPH FIELD, TEXAS

10 November 1943

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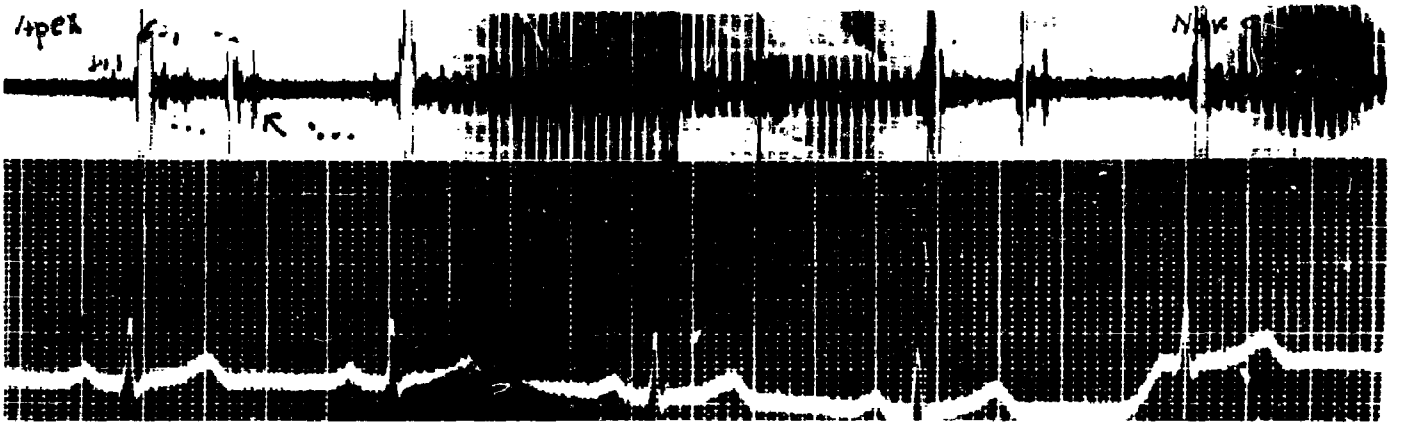
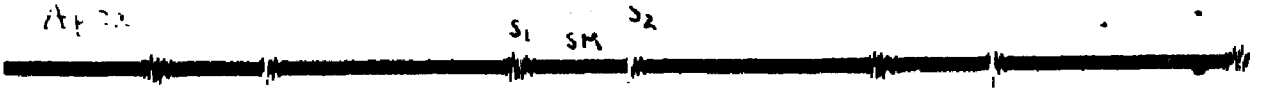
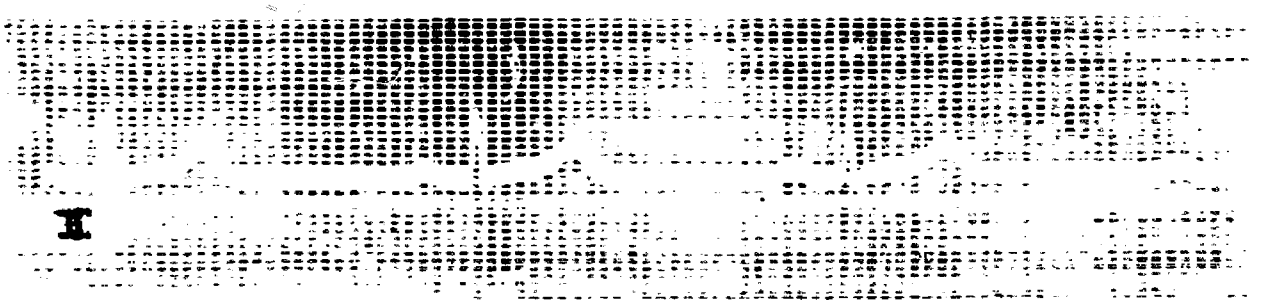


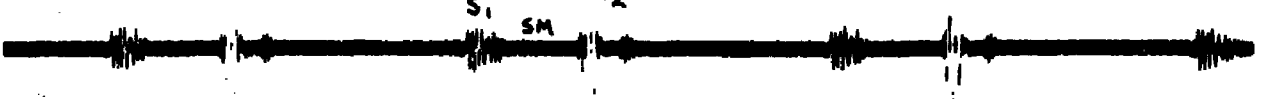


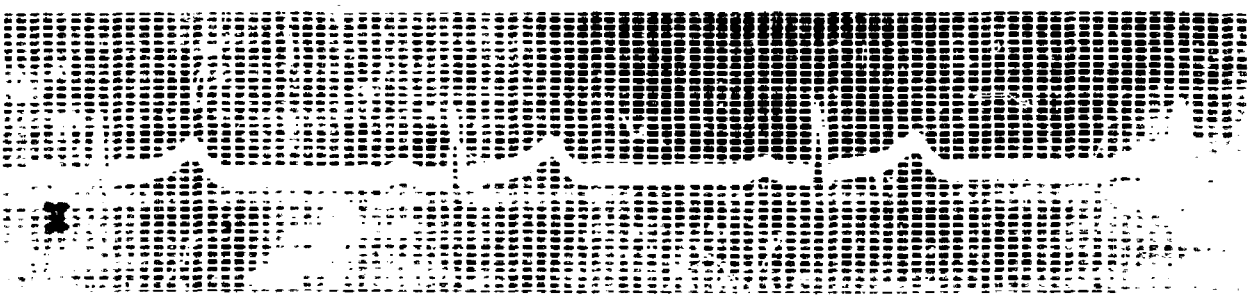
II

Lf. sternal edge, 4 i.c.s.



Pulmonic





Aortic